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| 09/853,674 | 05/14/2001 | Takao Morii | Q62558 | 6818 |

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| EXAMINER | |
|---|---|
| FISCHER, JUSTIN R | |
| **ART UNIT** | **PAPER NUMBER** |
| 1733 | |

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/853,674 | MORII ET AL. | |
| | Examiner | Art Unit | |
| | Justin R. Fischer | 1733 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *30 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *2-9,11-14,16-20 and 22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-9,11-14,16-20 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 2-6, 11-13, 16-19, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (JP 11-78411, of record) and further in view of Sato (JP 11-78410, of record), Sinopoli (US 5,743,975, of record), and Koch (US 6,012,498, of record). The references are applied in the same manner as set forth in the Non-Final rejection mailed on July 29, 2005.

As best depicted in Figure 1, Sato '411 discloses a radial pneumatic tire construction having a belt reinforcement structure comprising two belt plies 4 formed of single wire metal cords and a radially outermost reinforcing layer or cap layer 5 formed of organic fiber cords, such as polyethylene naphthalate. While the reference fails to expressly describe the bunching arrangement of the claimed invention, one of ordinary skill in the art at the time of the invention would have found such a design obvious in view of Sato '410 in order to reduce the propagation of cracks that are commonly associated with belt layers. In particular, both Sato '410 and '411 detail the disadvantages of conventional belt reinforcing elements formed of twisted structures and further suggest the aforementioned benefits of using single wire metal cords (analogous to reinforcing elements of claimed invention). Furthermore, while Sato '411

fails to include a reinforcing layer formed of rubber between the belt and the tread, it is well known to include such reinforcing layers in the claimed location to optimize the reinforcing characteristics (i.e. improves puncture resistance), as shown for example by Sinopoli. Sinopoli suggests the placement of a reinforcing layer formed of rubber between the belt and the cap layer, which is the same location as the claimed invention, in order to improve the puncture resistance (Column 1, Lines 10-15 and Column 5, Lines 7-10). While Sinopoli fails to relate the modulus (tensile stress) of the reinforcing layer to the modulus of the tread, one of ordinary skill in the art at the time of the invention would have expected the modulus of the reinforcing layer to be greater than the modulus of the tread since the reinforcing layer functions as a puncture preventing layer (must have limited elongation (high modulus) to resist nails, stones, etc.) Koch is further applied to evidence the high modulus characteristic normally associated with puncture preventing layers located in the crown region (Column 3, Lines 3-7). As such, one of ordinary skill in the art at the time of the invention would have found it obvious to form the reinforcing layer with a higher modulus (tensile stress) as compared to the tread (in light of the function of the reinforcing layer and the recognized high modulus characteristic of similar layers).

With respect to the thickness of the plies and the intervals between metal wires, Sato '410 suggests a greater interval between adjacent bundles in the radially outer belt layer, wherein said interval in the radially outer belt layer is between 1.05 and 3 times that of the radially inner belt layer. As evident by the numerous examples in Tables 1-3, the intervals are dependent on the specific diameters used for the single wire metal

cords and the reference is directed to a plurality of embodiments, some of which meet the broad limitations of the claimed invention. Regarding the distance between bundles in different plies and the overall thickness of the two belt plies, it is clearly evident that a plurality of embodiments detailed by Sato '410 satisfy the limitations of the claimed invention using well known and conventional values for the topping rubber thickness in relation to the cord diameter. For example, if a 0.25 mm single wire metal cord is used, one of ordinary skill in the art at the time of the invention would have expected a distance between bundles in respective belt plies to be a minimum of 0.25 mm and most likely between 0.3 and 0.40 mm (based on topping rubber having a total thickness that is slightly greater than cord diameter). In turn, the overall thickness of the belt plies would be approximately 1.20 millimeters (each ply would have a thickness of appr. 0.60 millimeters using average topping rubber value). **It is noted that the respective distances (especially overall thickness and radial distance between bundles in respective belt plies) are dependent on the diameter of the single wire metal cord and the claim fails to require a specific diameter, such that embodiments that use a larger cord diameter within the range of the claimed invention would definitely satisfy the limitations of the claimed invention.** Thus, one of ordinary skill in the art at the time of the invention would have found it obvious to form the tire of Sato '411 in accordance to the limitations of the claimed invention (regarding thickness of ply and interval between wires or cords).

With respect to claims 5 and 6, Sato '410 describes a bunching arrangement in which between 2 and 6 single steel wire cords are adjacent one another. Thus, since

the single wire metal cords are adjacent one another, as depicted in Figure 2, the aspect ratio $D_S/D_L$ is analogous to that of the claimed invention (1/n, where $D_S$ is the short diameter, $D_L$ is the long diameter, and n is the number of metal wires in a given bunch).

Regarding claim 11, the inclination angle of the single wire metal cords is between 10 and 30 degrees with respect to the equatorial plane of the tire.
With respect to claims 12 and 13, the cap layer of Sato '411 is formed of organic fiber cords, for example polyethylene naphthalate, that are inclined at an angle of 0 degrees with respect to the equatorial plane of the tire.

With respect to claims 12 and 13, the cap layer of Sato '411 is formed of organic fiber cords, for example polyethylene naphthalate, that are inclined at an angle of 0 degrees with respect to the equatorial plane of the tire.

With respect to claim 17, the broad range of the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention in view of Sinopoli. While Sinopoli fails to expressly describe the width of the rubber layer, Figure 1 appears to depict the rubber layer as extending the same width as the cap layer, which in itself extends slightly beyond the edges of the belt structure. Thus, one of ordinary skill in the art at the time of the invention would have expected the rubber layer to have an axial width that is greater than 100% of the width of the innermost belt layer and further would have readily appreciated an embodiment in which the extension was less than 10% beyond the extent of the innermost belt layer. Furthermore, one of ordinary skill in the art at the time of the invention would have readily appreciated the

additional, claimed values for the axial extension of the rubber layer, it being noted that Sinopoli does not place any criticality on the axial extension and applicant has not provided any conclusive showing of unexpected results to establish a criticality for the claimed axial extension. Also, similar belt reinforcing rubber layers have extended axially beyond and axially inward of belt layers.

With respect to claims 18 and 19, applicant defines a first range of 0.2 to 1.2 millimeters for the thickness of the rubber layer and a second, narrower range of 0.3 to 0.8 millimeters for the same. While Sinopoli fails to address the thickness of the rubber layer, the relevant figures appear to depict a rubber layer having a thickness on the same order as the adjacent belt plies (i.e. rubber layer not depicted as being significantly large or thin). Thus, since the claimed dimensions define well known belt structures depending on the specific type of tire, one of ordinary skill in the art at the time of the invention would have found it obvious to include the quantitative relationships of the claimed invention, it being further noted that the claimed ranges represent well known dimensions of rubber layers, in general, that are disposed between respective plies in the belt region.

Regarding claim 22, it is well known and conventional in the tire industry to reinforce a given rubber component with short fibers, either organic or steel, in order to provide increased modulus and strength properties as desired.

3. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato '411, Sato '410, Sinopoli, and Koch as applied to claim 2 above, and further in view of

Bourgois (US 5,198,307, of record). The references are applied in the same manner as set forth in the Non-Final Rejection mailed on July 29, 2005.

While Sato '411 and Sato '410 teach the bunching of single wire metal cords having a diameter between 0.20 and 0.35 millimeters, the references fail to describe the specific makeup of said single wire metal cords (i.e. composition of metal and tensile strength). In any event, one of ordinary skill in the art at the time of the invention would have recognized the composition and properties of the claimed invention as defining well known metals that are extensively used in belt reinforcement structures, as evidenced by Bourgois. In this instance, Bourgois suggests a similar belt structure in which single wire metal cords having a diameter between 0.10 and 0.40 millimeters are bunched together, wherein said single metal wire cords have a preferred carbon content between 0.75 and 0.85 % and a tensile strength defined in relation to the diameter of said single wire metal cords that renders the broad range of the claimed invention obvious (Column 1, Lines 30-40). As such, one of ordinary skill in the art at the time of the invention would have readily appreciated and expected the single wire metal cords of Sato '411 to exhibit the same tensile characteristics and be formed of a similar composition, regarding carbon content, in view of well known belt reinforcement materials, as evidenced by Bourgois.

Regarding the tensile strength, Bourgois provides the following statement: "The core filaments (analogous to single wire metal cords) preferably have a tensile strength **above**

$2,235 - 1,130 * \log d$ ($N/mm^2$ or MPa)

whereby d is the filament diameter expressed in mm." The following table provides a list of different diameters falling within the range of the claimed invention and suggested by both Sato '410 and Sato '411 and their corresponding tensile strength.

| | Diameter (mm) | Tensile Strength (MPa) |
|---|---|---|
| Example 1 | 0.20 | > 3,115 |
| Example 2 | 0.25 | > 3,005 |
| Example 3 | 0.30 | > 2,916 |

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato '411, Sato '410, Sinopoli, and Koch as applied to claim 2 above, and further in view of Kawase (US 3,929,180, of record). The references are applied in the same manner as set forth in the Non-Final Rejection mailed on July 29, 2005.

Sato '411, in view of Sato '410, discloses a radial pneumatic tire construction in which a two ply belt layer is sandwiched between a carcass structure a radially outermost cap layer, wherein said belt layer contains reinforcing elements in the form of single wire metal cords that are arranged in bundles. In describing the radial carcass, however, the references are completely silent with respect to any specific material. In any event, the use of PEN (polyethylene naphthalate) cords in a carcass structure is extremely well known and conventional. For example, Kawase describes the use of PEN cords to form a radial carcass structure since such a cord provides a plurality of

advantages over conventional materials, such as steel, nylon, rayon, and even polyethylene terephthalate, including better high speed durability and fatigue resistance (Column 6, Lines 35-55). As such, one of ordinary skill in the art at the time of the invention would have found it obvious to form the carcass of Sato '411 with PEN cords since the aforementioned benefits are desirable in all vehicle tires.

5. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sato '411, Sato '410, Sinopoli, and Koch as applied to claim 16 above, and further in view of Mechanics of Pneumatic Tires (of record, Page 881). The references are applied in the same manner as set forth in the Non-Final Rejection mailed on July 29, 2005.

As stated above, Sinopoli illustrates the known use of a puncture preventing means in the form of a crown rubber reinforcing layer and while Sinopoli is silent as to the modulus (tensile stress) of the rubber reinforcing layer, one of ordinary skill in the art at the time of the invention would have recognized the high modulus characteristic normally associated with such crown puncture preventing layers in view of Koch. As such, one of ordinary skill in the art at the time of the invention would have readily appreciated a higher modulus rubber material in the rubber reinforcing layer as compared to the tread rubber. However, in these instances, the references fail to give a specific quantitative value for the modulus (tensile stress) of the reinforcing layer. In any event, the claimed range of 1.0 to 8.0 MPa for the modulus (tensile stress) of the rubber reinforcing layer would have been readily appreciated by one of ordinary skill in the art at the time of the invention as it defines a broad and well-known range for tire rubber compositions. Also, Mechanics of Pneumatic Tires describes the tread rubber

as having a common modulus of 2.9 MPa, further suggesting that the rubber reinforcing layer, which has a larger modulus as compared to the tread rubber as set forth above, would have a modulus (tensile stress) between 1.0 and 8.0 MPa.

***Response to Arguments***

6. Applicant's arguments filed January 30, 2006 have been fully considered but they are not persuasive.

Applicant initially argues that neither Sato '410 or Sato '411 disclose or suggest the claimed interval and in all of the examples of Sato '410, at least one of the respective cord intervals is outside of the claimed range. The examiner agrees with both statements. However, the rejection is not based on any single example disclosed by Sato '410 but rather the general recognition that the claimed spacings (0.25 to 1.0 mm) would have been obvious given (a) the general range of disclosed spacings by Sato '410 and (b) the teaching by Sato '410 that the radially outer bundle spacing is between 5 and 300% greater as compared to the same of the radially inner bundle spacing. It is emphasized that a wide variety of embodiments suggested by Sato '410 would have resulted in a bundle spacing within applicant's broad range. For example, given an inner bundle of spacing of 0.72 mm (example 1), one of ordinary skill in the art at the time of the invention would have found it obvious to form an outer bundle spacing between 0.76 and 2.2 millimeters. It is additionally noted that it does appear that the bundle spacing is a function of the cord diameter (see Table of Declaration)- given the absolute values of the claimed invention, one of ordinary skill in the art at the time of the

invention would have readily appreciated an assembly in which the bundle spacings satisfied the claimed invention depending on the specific tire being manufactured.

As to the Declaration, **it is unclear if the benefits are a function of the actual bundle structure and/or the bundle spacing.** It is suggested that applicant conduct an experiment in which the same bundle structure is used, while varying the bundle spacing. In this same regard, applicant suggests that belt end separation cannot be suppressed if the spacing is less than 0.25 millimeters and belt rigidity is too low if the spacing is greater than 1.00 millimeters. These benefits, though, are purported benefits and applicant has not provided a conclusive showing of unexpected results to establish a criticality for the claimed bundle spacing. As noted above, Table 3 of the Declaration fails to identify the benefits directly associated with the claimed spacing.

***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin R. Fischer whose telephone number is (571) 272-1215. The examiner can normally be reached on M-F (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Justin Fischer

March 30, 2006